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Television has neither eliminated, reduced, nor replaced man's need and use of books, but has merely increased his appetite for knowledge. Librarians, book publishers, magazine and newspaper publishers all attest to increased growth and use of printed materials since the advent of electronic communication. Educational television was spurred in the 1950's by allocation of 250 channels for educational use and by financial support given for pioneering the use of TV for educational purposes by private and foundation funds Problems for educational television came with opposition by commercial stations to channels allocated for educational purposes, with attitudes of teachers who looked upon it as a job threat, with technical problems of transmission, reception, timing and scheduling, and costs. The three levels at which students may take part in any learning experience are action, reaction, and interaction, and television presents the possibility by machine of talking and demonstrating a textbook. Automation and machines are effective in improving the quality and efficiency of learning. Since machines will produce only what is programmed into them, the future of teaching machines lies in intelligent programming of learning materials, adaptable to machine presentation and utilization. The next twenty-five years, barring unforeseen deterrents, will see complete integration of many successful teaching machines in the effort to disseminate and improve quality instruction.

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TELEVISION IN EDUCATION AND TEACHING MACHINES

by
T. J. Jenson
Professor of Educational Administration
The Ohio State University

The history of man's progress in all fields of human endeavor and development might well be considered to be directly related to his progress in the arts of communication. The periods in the history of mankind stand out like chapters in the story of the inventions of communications media -- the spoken word, written symbols, various types of signals, the alphabet, printing, moveable type, the telegraph, radio and now television.

Man has always sought to perpetuate his progress by passing on knowledge, skills, attitudes (education) to others of his own time and to future generations. In the process he has used communication media. Except for word of mouth, the older media -- symbols, signs, books and the like -- were slow and cumbersome. Then came telephone, radio and television which provided instantaneous communication possibilities to the world's billions of peoples. TV is really an extension of radio. With radio one does not need to read and interpret written or printed symbols and actions. One needs only to listen and understand. With TV has come another dimension -- he sees as he listens, to get meaning of what others are trying to show and tell him.

Replacement for books -- No.

TV has neither eliminated, reduced, nor replaced man's need and use of books and the printed word. TV has merely whetted his appetite for more knowledge -- a yen to push back the frontiers by bringing more knowledge. We read more today than ever in our history. Librarians, book publishers, magazine and newspaper publishers all attest to increased growth and use of printed materials since the advent of electronic communication.

Early Beginning of TV in Education

Late in the 1940's and 1950's found some pioneers in the nation's schools and colleges using TV in instructional programs. The big push came in the 1950's through two events: (1) allocation of 250 TV channels for educational use by FCC, and (2) financial support given for pioneering in the use of TV for educational purposes by private and foundation funds.

Closed Circuit Transmission

The Hagerstown, Maryland, (closed circuit) experiment now in its fifth year is well known. Through the use of coaxial cable six different lessons are transmitted simultaneously - elementary and secondary. The program has met with marked success and is being studied by educators from all over the country.

Open Circuit Transmission

Open circuit telecasting for educational purposes has been experimented with and is now in use in dozens of colleges, universities and cities throughout the nation -- some on commercial channels in cooperation with local telecasting companies; some on educational channels; some UHF; some VHF; some by IO (image orthicon); some by (vid.) Vidicon; some Kinescoped; some live; and some taped.

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Another interesting experiment now in its third year (The National Program in the Use of TV in the Public Schools), supported by the Ford Foundation, includes Anaheim here in California and at least seventeen other school systems scattered across the country. The range of subjects taught take in most of the general curricular offerings -- languages, music, sciences, mathematics, history, social studies, art. Des Moines is experimenting with teaching handwriting by TV and Dade County, Florida, is teaching driver training via TV.

Airborne Television

MPATI* -- the program I am most closely acquainted and associated with through the Ohio State University, one of the coordinating centers for the program, is the latest experimental venture. This is an airborne open circuit educational telecasting from a big four-motor job flying 23,000 feet above Montpelier, Indiana.

This is a $7,000,000 "TV School in the Sky" experiment. On May 15 this year it began demonstration telecasting. Good reception was reported at points as far as 187 miles from the plane flying in a monotonous twenty-mile diameter circle. Already arrangements have been made for some existing educational TV ground stations to receive and boost the signal on the fringe areas, thus extending the radius to up to 300 miles in some instances.

Each of two big DC6AB planes -- one a stand-by -- is equipped with two transmitters, frequency and modulation monitors, two tape recorders, a master control console, a vidicon camera, and a double cabinet filled with auxiliary apparatus. In the tail section is a 75 KW generator for power. 128 lessons in 28 different courses from first grade to college level have been prepared and programmed.

Telecasting of regular programs will begin in earnest next September, on two channels, 72 and 76 (UHF); one on materials for elementary grades and the other on high school and higher education materials. Programs will be telecast from 8:00 A.M. until 3:00 P.M., Monday through Thursday.

The area served involves 5,000,000 students in 13,000 school locations. Estimates on costs for receiving equipment average $500.00 per classroom. Estimates on costs for operating the program average $2,000,000 per year.

The teacher talent testing for producing the programs involved the auditioning of 300 teachers, selecting 88 possibilities, and actually using 17 (9 women and 8 men) in program productions.

Ground Organization

Twenty coordinating centers in the seven-state area have been organized at colleges and universities. Each has a full-time coordinator who in turn works with an advisory committee of lay and professional people in the area.

The coordinating centers serve two main purposes: (1) workshops, conferences and meetings to assist local schools in tooling up and using telecast instruction, and (2) feedback for MPATI providing information to assist in making the program more effective. More than 2,000 classroom teachers and administrators have attended five-day intensive workshops on the use and implementation of TVI.

* Midwest Program for Airborne Television Instruction

Best of Television Teaching Techniques

MPATI combines the best of TV Teaching Techniques:

1. Lessons present problems and solutions; ask open-ended questions, often leaving attempted solutions to discussion in the follow-up periods, and independent study.

2. The "presentor" (studio teacher) asks thought-provoking questions, stimulating students to independent research and thinking, and motivating youngsters to wider reading. Lessons are geared toward making the student more aware of his own responsibility for a share in his education.

3. Courses are accompanied in every case by classroom discussion - (led by the classroom teacher), projects, and suggested assignments. Tests determine effectiveness of critical thinking.

Wide use is made of visual aids and props. Models are built, apparatus and equipment brought together that would be absolutely impractical for most of the schools involved. In some lessons the teacher appears on the screen less than half of the time.

Some Questions

Why not a balloon instead of a plane?
Can't keep a balloon steady enough.

Why not a ground based system of towers and antennas -- eliminate the plane?
Costs at least three times as much and can't get the distance.

Why not films?
Video taped lessons have the big advantage of immediacy - many don't have projectors and many teachers can't operate them.

What about the plane in bad weather?
Plane will be able to fly 98% of the time. A stand-by plane is kept ready at a distant city to fly over and telecast.

What is the crew on the plane?
Pilot, copilot, flight engineer and three television engineers.

Why on video tape lessons - why not live broadcasts?
Totally possible sometime.

Some Problems for ETV

One of the first problems in the use of TV for education came with the allocation of channels for educational purposes. Opposition came from commercial stations who foresaw the tremendous need for future channels and from a segment of the population who sincerely think that allocation of such channels to governmental or quasi-governmental agencies such as schools and colleges presents a threat of their use for propaganda purposes, partisan politics and machines for engineering consent.

Another big problem came with the attitude of teachers to TV instruction. The teacher looked upon it as a threat to his profession, which of course it is not. Teachers have looked upon every new media of communication as a threat.

When printing came along the ancient scholars thought they were through. They were no longer needed to copy materials on scrolls and parchment - now they write books. When radio came along, the same was true, but we still needed teachers.

Then there are technical problems. Problems of transmission and reception. Problems of timing and scheduling. The airborne experiment cuts across two time zones, EST and CST. And there are many other problems of this nature too numerous to mention.

Cost is a big problem. Figure $500 per classroom for reception alone and you have a large figure.

Then there are the problems of effective use, evaluation and appraisal. Does TVI really make a difference? Will and does it improve the quality of instruction? Answers to this problem seem to be definitely in the affirmative.

Unresolved Instructional Problems

A complete listing of the problems and issues still confronting educational television would certainly include the following:

1. What should be the class size of groups getting instruction by TV? Present practice seems to indicate that there is no ideal size. It may be that groups of varying sizes may profitably get instruction via TV.
2. How many days each week should instruction by television be given in a particular course or subject? Should it be given daily or should several days each week be devoted to full-time class activities and instruction without TV?
3. How much time during any class period should be devoted to TV? What is the ideal time division for TV instruction and for follow-up?
4. How can school schedules, time differences and TV schedules be effectively coordinated? Will more uniformity be necessary? Is this good or bad?
5. How can TV instruction appropriately and effectively provide for individual differences among pupils? What should be the respective roles of the "presentor" or studio teacher and the classroom teacher in the provisions for individual differences among pupils in a particular class?
6. How can the studio teacher and the classroom teacher more effectively coordinate their instruction, their assignments, and their procedures so as to provide for a truly unified program of instruction?
7. How can copyrighted materials be made available for more general use by studio teachers? This is a very real problem to the TV teacher - written work, music and pictures especially. A solution to this problem on a national level would be most helpful.
8. What effect does TV teaching have on the curriculum -- determination, content, standardization, flexibility?

It should be noted that some of these problems and issues are not peculiar to TV teaching, but are unsolved problems in education generally.

Teaching Machines

Television is a teaching machine. It is just one of the many pieces of apparatus and mechanical devices used in the process of today's learning. The ancient abacus is a simple machine too, used in teaching mathematical concepts.

First, let's look at learning as related to tools of instruction. There are at least three levels at which students may take part in any learning experience:

1. Action level - the student on his own initiative teaches himself through the use of suitable materials.
2. Reaction level - the student learns by reacting to the instruction of a teacher - personally or through a machine.
3. Interaction level - the student learns by interaction with teachers and peers using various media, apparatus and instructional materials.

TV presents the possibility, via machine, of a "souped-up" talking and demonstrating textbook.

We know too that learning efficiency is related to: (1) gaining and holding the students' attention, (2) the call upon the student to react - rereact immediately, (3) the reinforcement provided in the learning situation, and (4) the opportunity for one to make immediate checks upon himself to see whether or not he has mastered something.

These are all facts that make sense in the use of machines as tools for instruction. The same kind of good sense as the use of the encyclopedia.

Machines like other apparatus make it more possible to efficiently utilize the individual and/or the group learning process. Instances where a general mass presentation is desired involving special props and equipment, TV can be utilized. Where individuation is required the student can work alone as in the language laboratory, with the reading accelerator, in the chemistry lab, or with the concept reviewer for a given course or subject.

It was fine to have Johns Hopkins on one end of the log and the student on the other end. But how much better it would have been if Johns might have had machines, tools and other instructional equipment to provide real quality, efficiency and effectiveness in the instruction of his student.

The issues then are not machine or no machine in teaching. The issues are much more fundamental. We can agree that the use of automation and machines will and have been demonstrated as effective in improving the quality and efficiency of learning.

The really big issues are: (1) programming instruction for machine use, (2) the intelligent, imaginative and appropriate use of the machine in the learning problem, and (3) the costs involved.

Issues two and three are no pushovers, but I feel we can meet these challenges if we can first meet the challenge of programming.

Machines will produce only what is programmed into them. If this is good and effective, it can be most helpful. If it misses the point in any respect or is faulty in any manner, the effectiveness is diminished by that error. We have a long way to go in programming instructional materials for machine use. Some samples now being paraded under the enthusiasm for a new fad in education are most regrettable.

Our big task then is programming certain aspects of learning for machine utilization that will assist and enhance the quality of instruction. The future of teaching machines is as bright as we make it in intelligent programming of learning materials, adaptable to machine presentation and utilization.

From the point of view of administration the machine-taught lessons revolved around a number of important ingredients. These seem rather obvious but the manner in which they are used will determine the success and effectiveness of machine teaching.

The ingredients may be classified under the following: personnel, classes and classrooms, equipment, courses, materials, resources, and attitudes. Elaborations on these factors may be gleaned from the vast literature being developed.

The Future

There is only one plausible direction in which TVI and teaching machines will take - forward. We are on the threshold of developments in this area which stretch our imagination. Unless there are unforeseen deterrents, in the next twenty-five years we shall see complete integration of many successful teaching machines as another milestone in a continuous effort to disseminate and improve quality instruction.

July 1961